

Application No. 07/709,858, filed 6/4/91, abandoned; and U.S. Patent Application No. 07/788,065, filed 11/5/91, U.S. Patent No. 5,440,240; and U.S. Patent Application No. 07/981,956, filed 11/24/92.

This application is related to U.S. Patent No. 08/406,637 filed 3/30/95.--

In the claims

Please cancel claims 45, 51-56 and 71.

44. (thrice amended) An attachment member for use with a testing apparatus for testing a semiconductor [integrated circuit] die, said attachment member adapted for establishing [ohmic] an electrical connection[s] with a contact location[s] on the die, said attachment member comprising:

a) a substrate having a [plurality of] contact[s] formed thereon;

b) [the] said contact[s projecting] extending from a surface of the substrate and [positioned so that the contacts may be placed in] adapted to align [alignment] with the contact location[s] on the die and formed with a height for separating the die from the surface of the substrate;

c) [each] said contact [including a bump having] formed with at least one [a] raised portion extending from a surface thereof and [formed of a conductive material extending from a surface of the bump and] adapted to penetrate [a respective] the contact location on the die for establishing [an ohmic contact] the electrical connection [therewith], said [bump and] raised portion formed and dimensioned so that, when the die and the substrate are biased together in the testing apparatus [with a predetermined biasing force], the raised portion will penetrate the contact location [to a limited penetration depth,] while the surface of the [bump] contact abuts the contact location to limit a penetration depth into the contact location; and

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d) a [plurality of] conductive trace[s] formed on the substrate and electrically connected to the raised portion [of the contacts; and]

[e] means for providing an electrical path between the conductive traces and leads of the testing apparatus].

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48. (twice amended) An attachment member as described in claim 44, and further comprising:

forming the [plurality of] contact[s] and raised portion of semiconductor material using semiconductor circuit fabrication techniques.

49. (twice amended) An attachment member as described in claim 48, and further comprising:

forming the substrate and [the plurality of] contact[s] out of silicon, and forming the [circuit] conductive trace[s] on the substrate using semiconductor fabrication techniques.

72. (thrice amended) An attachment member for electrically connecting an unpackaged semiconductor die to a testing apparatus, said attachment member comprising:

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a substrate [formed of a semiconductor material];
a contact formed on the substrate corresponding to a contact location on the die, said contact [including a bump projecting] extending from a surface of the substrate and including at least one raised portion [formed of a conductive material and projecting] extending from a surface thereof [of the bump], said [bump and] raised portion formed and dimensioned such that when the die and the substrate are biased together in the testing apparatus with a [predetermined] biasing force the raised portion will pierce the contact location to establish an [ohmic contact] electrical connection therewith while the surface of the

77. ~~[Bump] contact abuts [a surface of] the contact location to limit penetration of the raised portion into the contact location and to separate the die from the surface of the substrate; and~~

~~a conductive trace formed on the substrate and electrically connected to the raised portion of the contact.~~

77. (twice amended) The attachment member as claimed in claim 72 and wherein the substrate is formed of a ceramic material and the raised portion[s are] is formed [by] using a doinking process.

78. (added) An attachment member for use in a test apparatus for establishing an electrical connection with a metal bondpad on an unpackaged semiconductor die, said attachment member comprising:

a substrate adapted for mounting within the test apparatus;

a contact formed on the substrate, said contact extending from a surface of the substrate with a height to provide a desired separation between the die and attachment member mounted within the test apparatus;

a raised portion formed on the contact, said raised portion projecting from a surface of the contact and dimensioned so that upon application of a biasing force by the test apparatus the raised portion penetrates the bondpad to a penetration depth that is less than a thickness of the bondpad while the surface of the contact abuts the bondpad; and

a conductive trace formed on the substrate for transmitting electrical signals from an external lead on the test apparatus to the bondpad.

79. (added) The attachment member as claimed in claim 78 and wherein the substrate is formed of a material selected from the group consisting of silicon, germanium, silicon on sapphire, silicon on glass and a ceramic.

80. (added) The attachment member as claimed in claim 78 and wherein the raised portion is formed as a point.

81. (added) The attachment member as claimed in claim 78 and wherein the contact and conductive trace are formed by semiconductor circuit fabrication techniques.

82. (added) The attachment member as claimed in claim 78 and wherein the bondpad is embedded in a passivation layer and the surface of the contact abuts the passivation layer.

83. (added) The attachment member as claimed in claim 78 and wherein the raised portion is formed as an asperity using a doinking process.

84. (added) The attachment member as claimed in claim 78 and wherein the conductive trace is adapted for wire bonding to the testing apparatus.

85. (added) The attachment member as claimed in claim 78 and wherein the contact and substrate are formed of a same material.

86. (added) The attachment member as claimed in claim 78 and wherein the contact and substrate are formed of silicon.

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